

# Claims

[c1] A fluid delivery system comprising a storage vessel for fluid which feeds a first pipe work loop including a first pump which urges fluid through said first loop at a first pressure and which returns to said vessel, said system including at least one pipe work branch fed from said storage vessel or said first pipe work loop, said pipe work branch including a second pump which urges fluid through said pipe work branch at a second pressure downstream of said second pump, each pipe work branch terminating in a branch manifold having at least a fluid inlet and one or more fluid outlets to the latter of which are connected one or more hoses which feed one or more offtakes from which fluid can be drawn from the system, each branch manifold providing a corresponding return manifold in fluid communication with said first pipe work loop to which said offtakes are connected by further hoses such that fluid can flow from said branch manifold through said hoses and thence through said return manifold and characterized in that the fluid having flowed through the return manifold is returned to the vessel when the offtakes are closed and .opening of said one or more offtakes, and thus the opening of said sys-

tem to atmospheric pressure at one or more locations, causes the direction of fluid flow to reverse in the one or more hoses which connect said one or more opened off-takes with the return manifold, said one or more opened offtakes being supplied with fluid from both the branch manifold and return manifold.

[c2] A fluid delivery system according to claim 1 characterized in that the branch manifold is fed from the storage vessel.

[c3] A fluid delivery system according to either claim 1 or 2 characterized in that the branch and return manifolds have at least a fluid inlet and one or more fluid outlets, said branch and return manifolds being disposed downstream of said first and second pumps with fluid communication between said manifolds being achieved by at least one hose connectable to fluid outlets on respective manifolds and including one or more offtakes thus allowing fluid flow from the storage vessel through the pipe work branch, branch manifold, hose, return manifold and first pipe work loop ultimately returning to said storage vessel and permitting fluid offtake at a desired location.

[c4] A fluid delivery system according to any preceding claim characterized in that said return manifold is provided

with a fluid inlet and a primary fluid outlet to allow for connection of said manifold within the first pipe work loop and a plurality of secondary outlets to which hoses having offtakes may be connected to allow for fluid communication with the branch manifold.

[c5] A fluid delivery system according to any of claims 1–3 characterized in that the branch manifold is provided with a fluid inlet and only secondary outlets to which hoses having offtakes may be connected such that the fluid flowing into said branch manifold is urged into one or more hoses.

[c6] A fluid delivery system according to any preceding claim characterized in that the fluid pressure within the return manifold is greater than the fluid pressure in the branch manifold.

[c7] A fluid delivery system according to any preceding claim characterized in that the pressures in the branch and return manifolds are above ambient atmospheric pressure such that the opening of an offtake opens the fluid within to atmospheric pressure and the fluid flow direction in the length of hose between said offtake and said return manifold reverses and both manifolds urge fluid towards said open offtake.

- [c8] A fluid delivery system according to any preceding claim characterized in that a plurality of hose connections are made between the branch manifold and the return manifold, each connection consisting of a first hose, one end of which is connected to one fluid outlet the branch manifold and the alternate end of which is connected to an offtake, a second hose having one end connected to the offtake and the alternate end connected to a fluid outlet of the return manifold.
- [c9] A fluid delivery system according to claim 8 characterized in that each hose connection between branch and return manifolds consists only of a single offtake.
- [c10] A fluid delivery system according to claim 8 characterized in that each connection consists of first and second hoses, ends of which are connected to the branch and return manifolds respectively, alternate ends of said hoses being connected to first and second primary offtakes, and the connection further comprising one or more secondary offtakes interconnected by intermediary hoses between said first and second primary offtakes and second secondary offtakes.
- [c11] A fluid delivery system according to any preceding claim characterized in that each hose is made of a flexible polymeric or plastics material such as PTFE.

- [c12] A fluid delivery system according to any preceding claim characterized in that the hose diameter is in the region of 5– 25mm.
- [c13] A fluid delivery system according to any preceding claim characterized in that at least one of the first or second pumps is dynamically controlled depending on the fluid pressure within the respective return or branch manifold, and most preferably the pump driving fluid through the first pipe work loop is dynamically controlled depending on the instantaneous fluid requirements of the system.  
i.e. the number of offtakes which are open at any one instant.
- [c14] A fluid delivery system according to claim 13 characterized in that only the second pump is dynamically controlled according to the fluid pressure within the respective return and branch manifolds.
- [c15] A fluid delivery system for the delivery of sterile fluid to a number of offtakes, each offtake selectively movable between open and closed conditions, said system including a storage vessel and fluid cleaning components provided in line in a first pipe work loop, said pipe work loop including a pump to urge fluid through said pipe work loop at a first pressure and return fluid to the ves-

sel, said pipe work loop including a branch manifold and a return manifold and characterized in that said branch and return manifold include, for each offtake, a pipe connection leading from the respective manifolds to said offtake such that, each of the plurality of offtakes is connected in parallel to the branch and return manifolds.

[c16] A system according to claim 15 wherein an opening of an offtake causes the supply of fluid to that offtake via respective pipes from the branch and return manifold and does not affect the fluid in the pipe work to the other offtakes.

[c17] A system according to claim 16 wherein the opening of said offtake or a series of offtakes causes the direction of fluid flow to reverse in the one or more pipes which connect said one or more opened offtakes with the return manifold.